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Risi

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(54) **ACTUATING ASSEMBLY FOR A LATCHING SYSTEM**

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USPC 70/275, 276, 277, 278.7
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(57) **ABSTRACT**

An actuating assembly of a locking system (**200**) to operate a displaceable component of a latching system (**210**), includes: (i) a first member (**24**) which is connected or connectable to the displaceable component of the latching system (**210**); (ii) a second member (**26**), the first and second members (**24**, **26**) being disconnectably connectable to each other, with the first and second members (**24**, **26**) being in an inoperative configuration when they are disconnected from each other such that the second member (**26**) is displaceable independently of the first member (**24**), and the first and second members (**24**, **26**) being in an operative configuration when they are connected to each other such that displacement of the second member (**26**) causes the first member (**24**) to be displaced; (iii) a first actuating sub-assembly (**46**) including a first key receiver (**230**) for receiving a non-mechanical first key in the form of a predetermined electromagnetic signal transmitted via a cellular telecommunications network from the communications facility (**224**) of a monitoring facility (**227**) to an electronic controller (**228**); (iv) a second actuating sub-assembly (**52**) which is operable by a second key (**226**), the second actuating sub-assembly (**52**) being operably connected to the second member (**26**)
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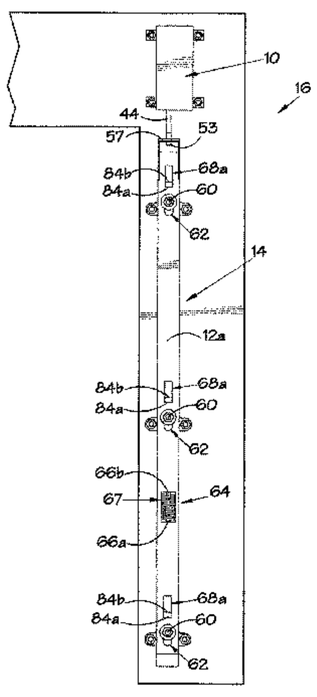

and being configured, when actuated by the second key (**226**), to cause the second member (**26**) to be displaced, thereby to cause the first member (**24**) to be displaced when the first and second members (**24**, **26**) are in their operative configuration; and (v) a timer for determining the time from receipt of a first key by the first actuating sub-assembly (**46**), wherein the first actuating subassembly (**46**) is configured, upon: (i) receipt of the first key, to cause the first and second members (**24**, **26**) to assume their operative configuration; and (ii) elapse of a preset time stored in a storage means (**236**) measured by the timer from receipt of a first key by the first actuating sub-assembly (**46**), to cause the first and second members (**24**, **26**) to assume their inoperative configuration.

26 Claims, 15 Drawing Sheets

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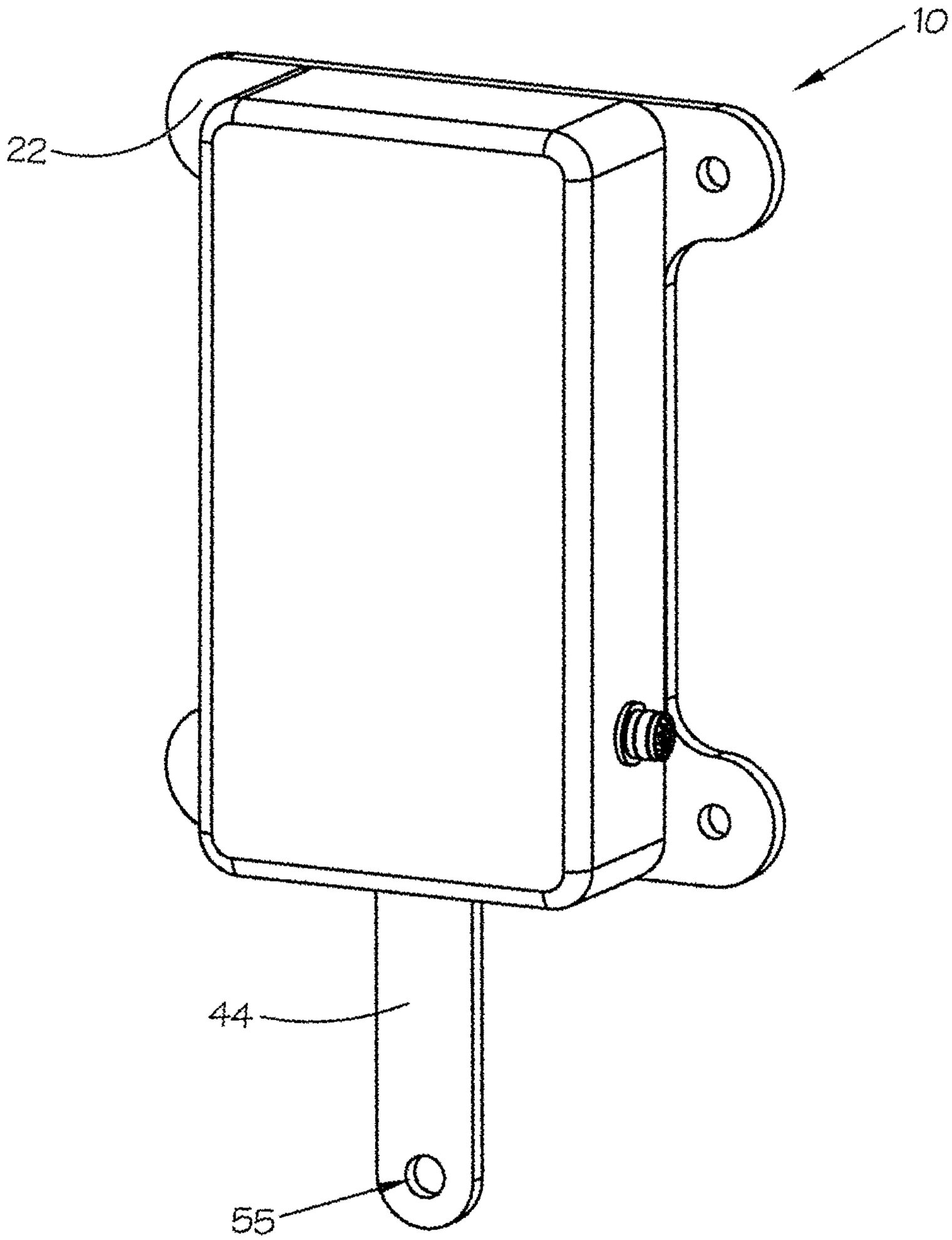

Figure 1

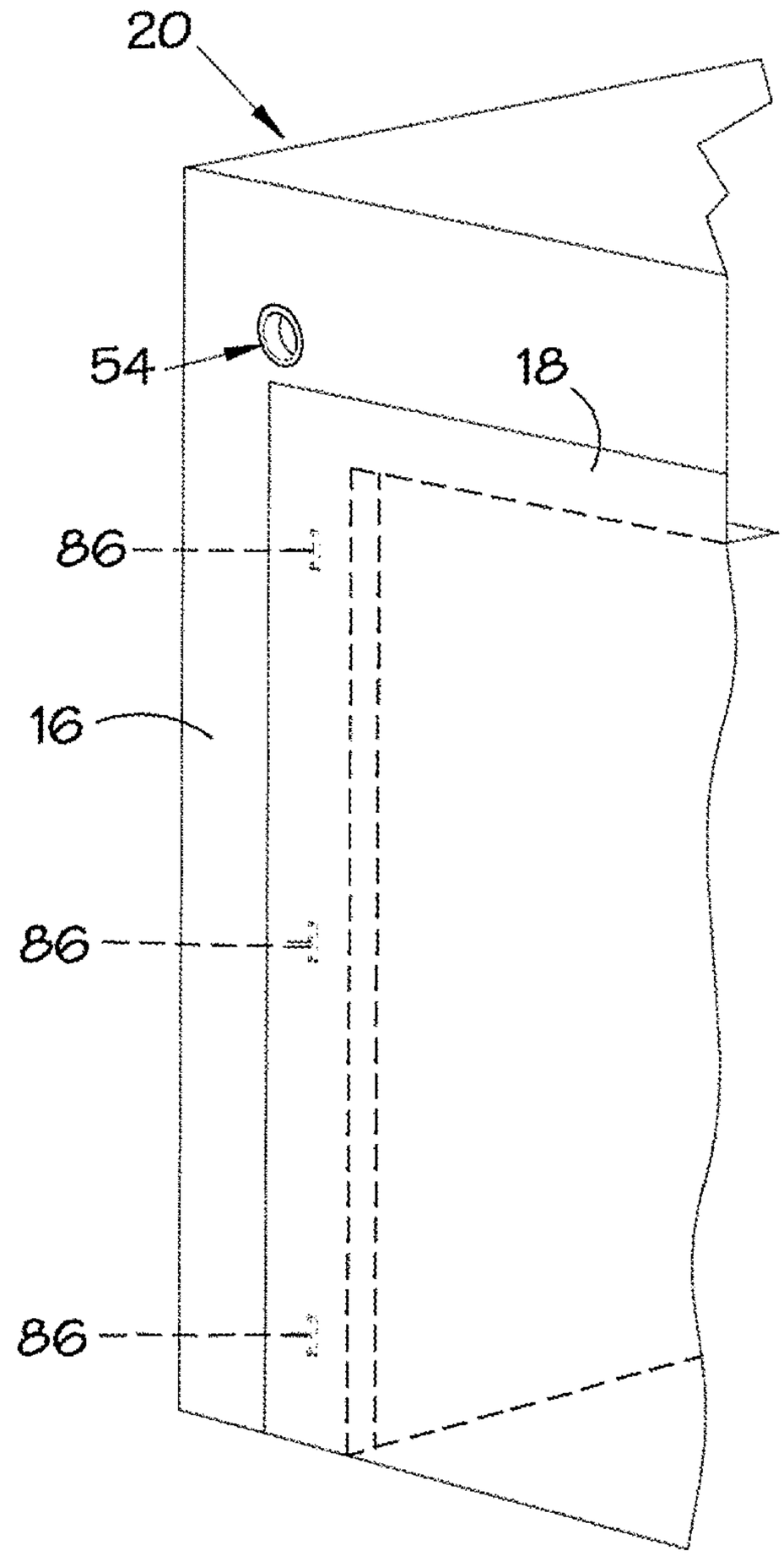

Figure 2

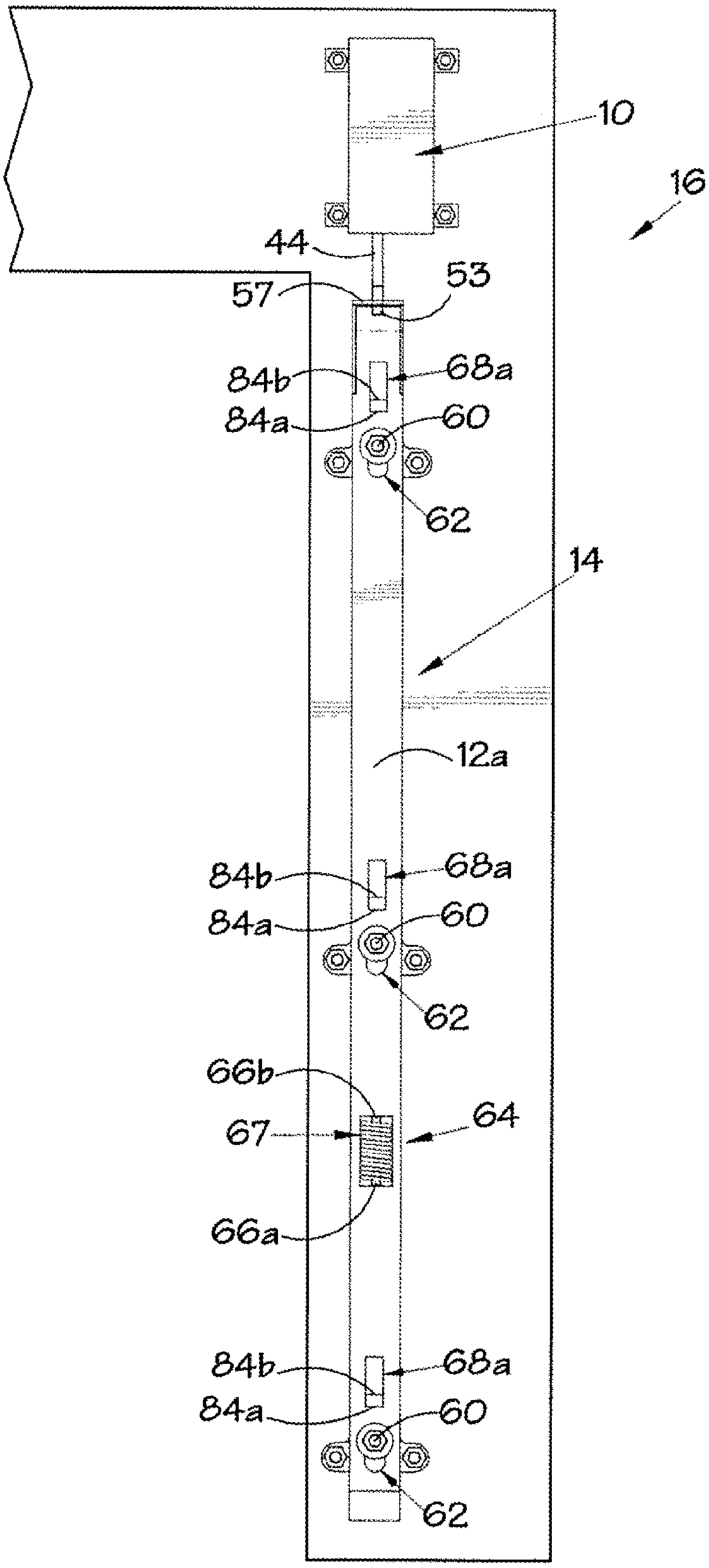
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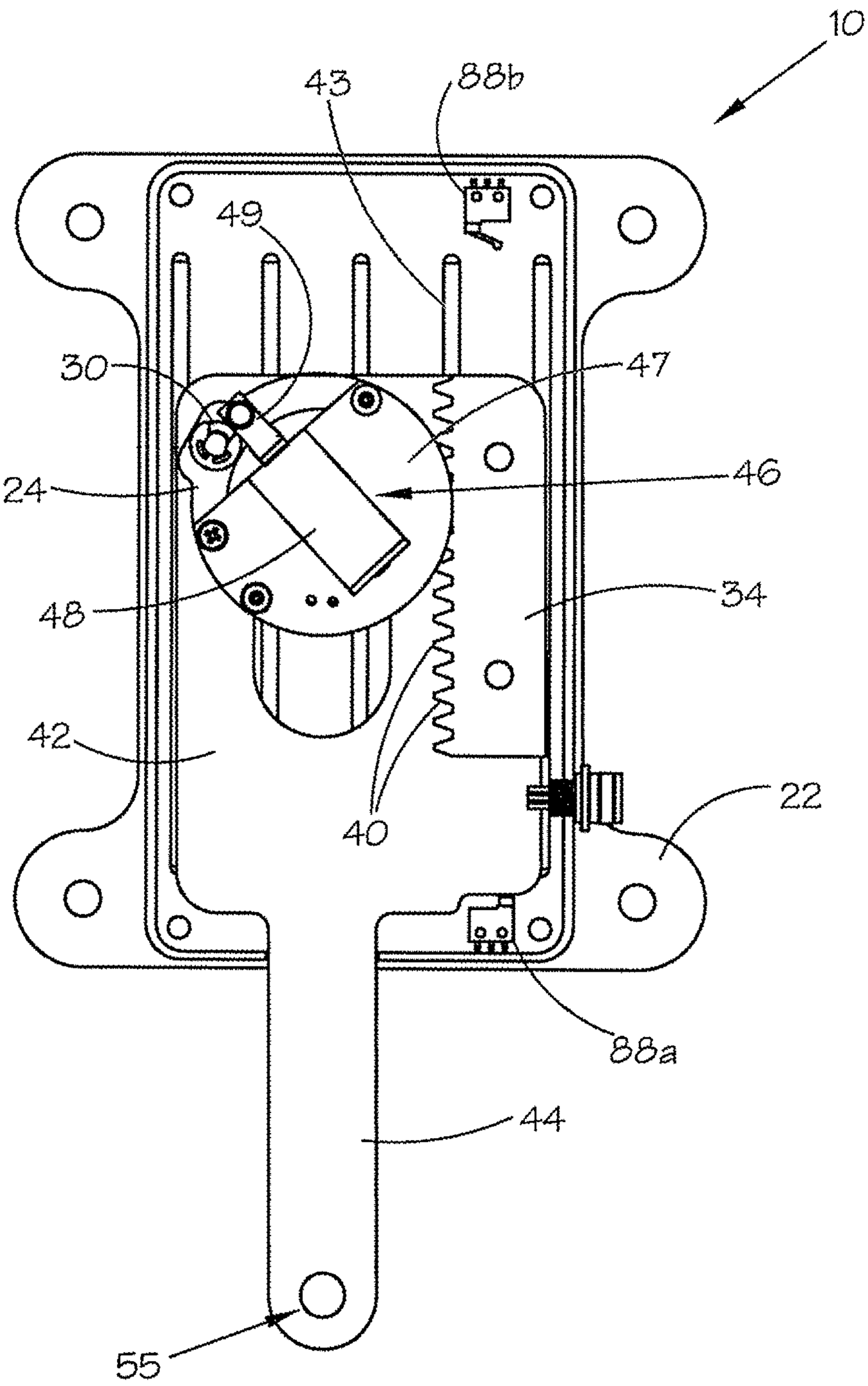
Figure 3



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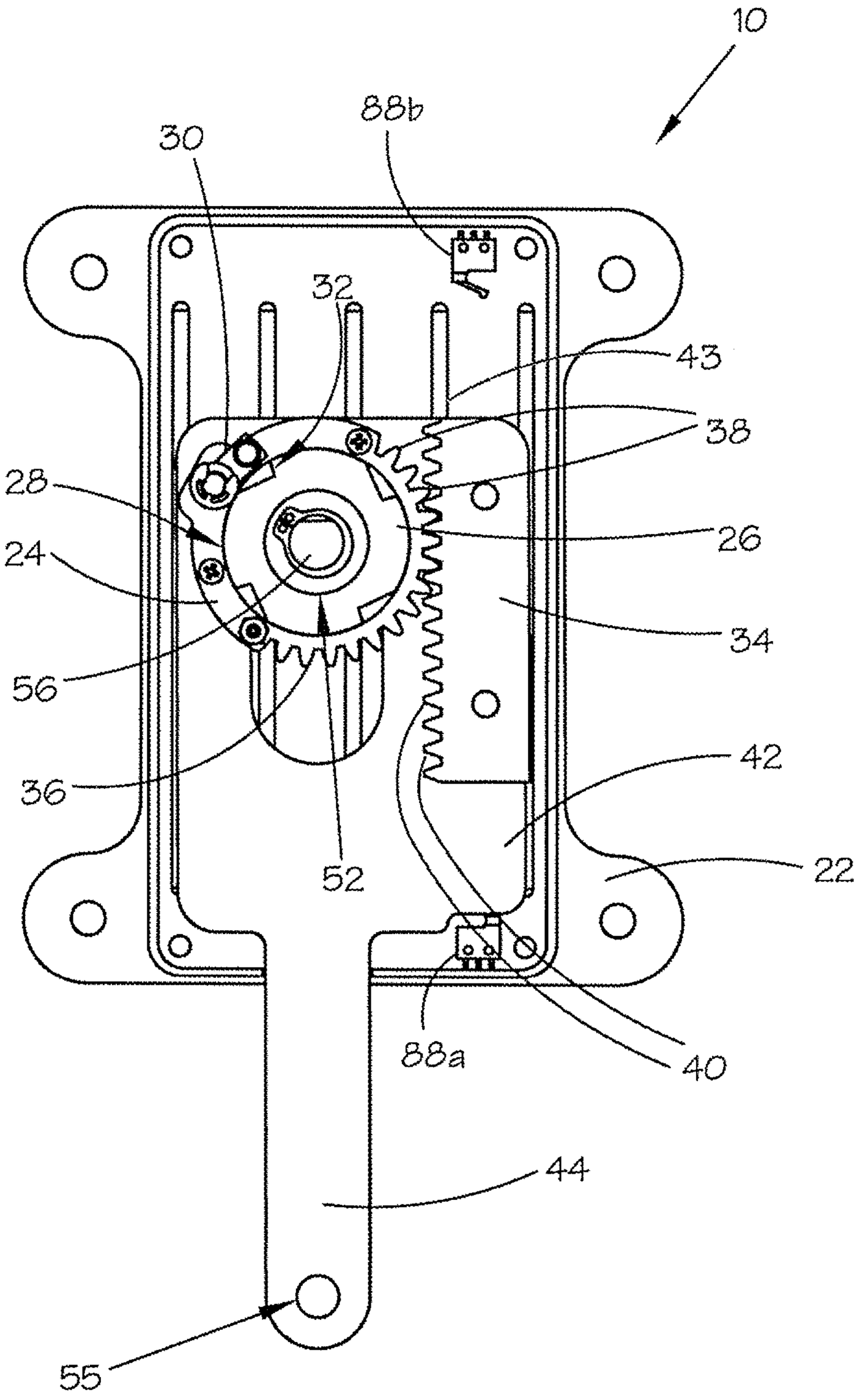

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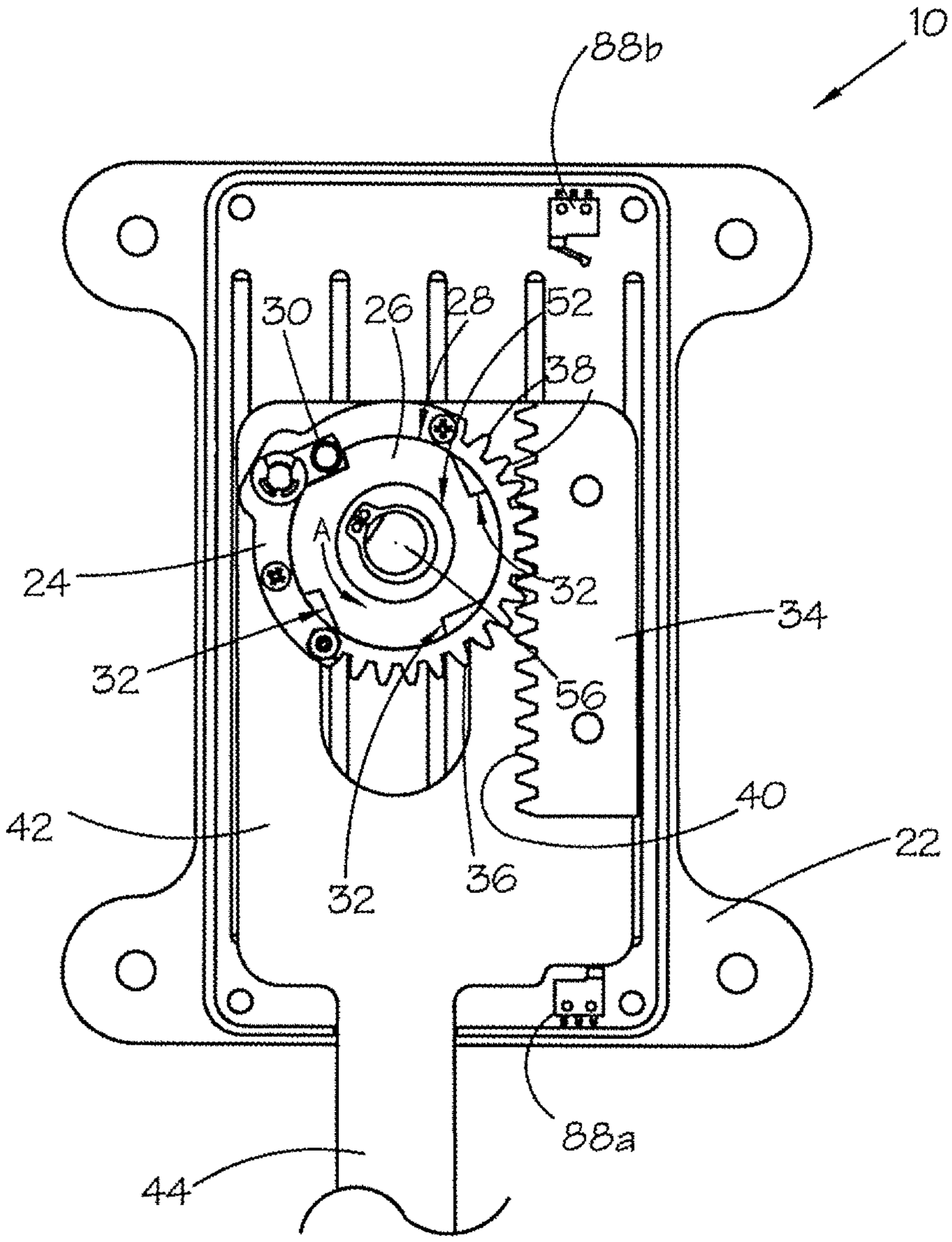

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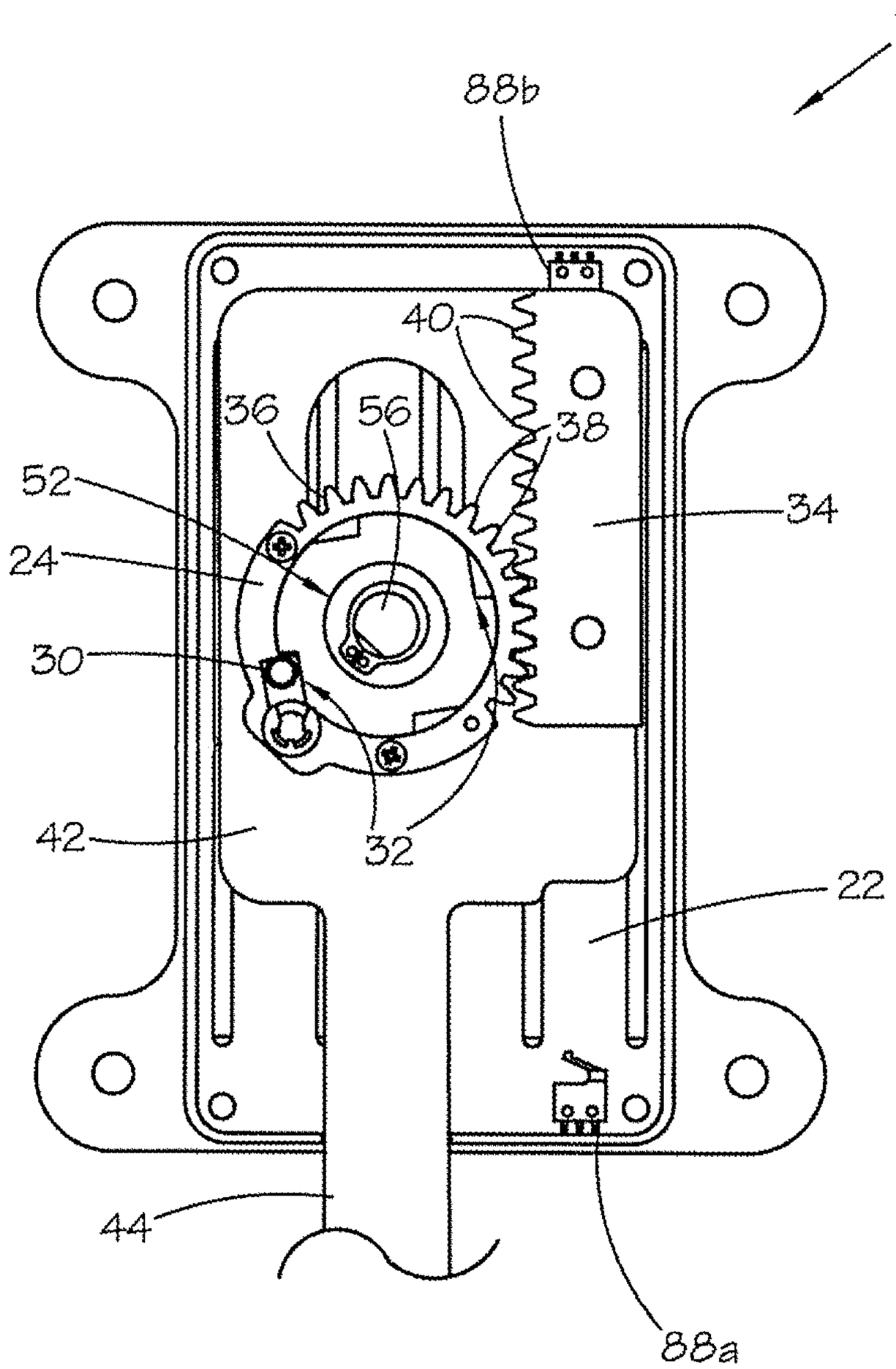

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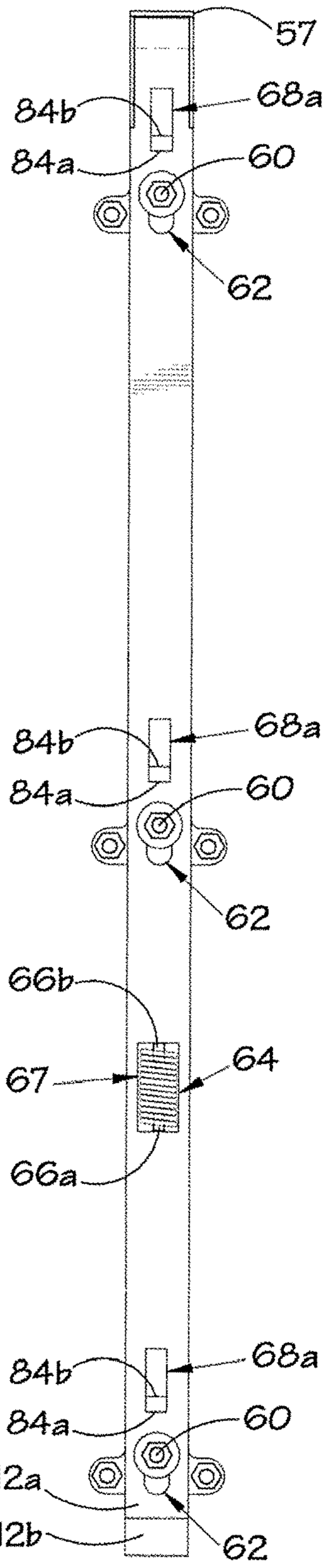
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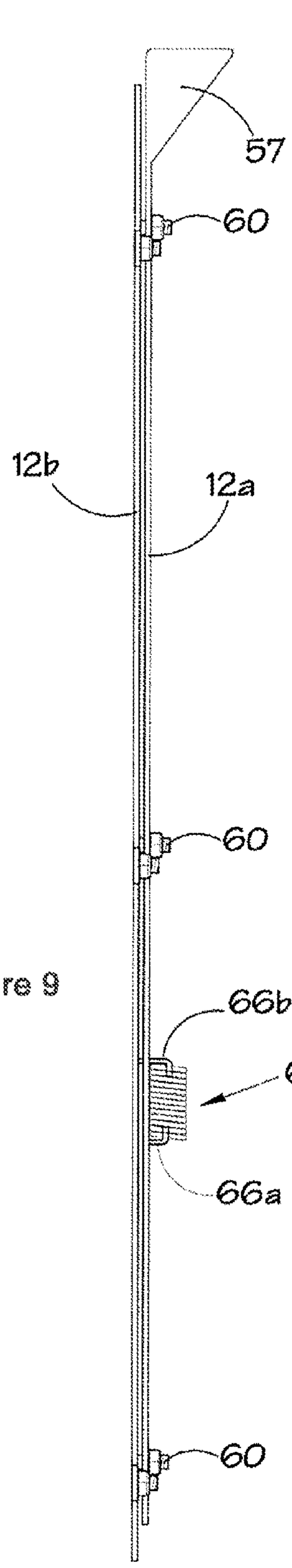
Figure 8



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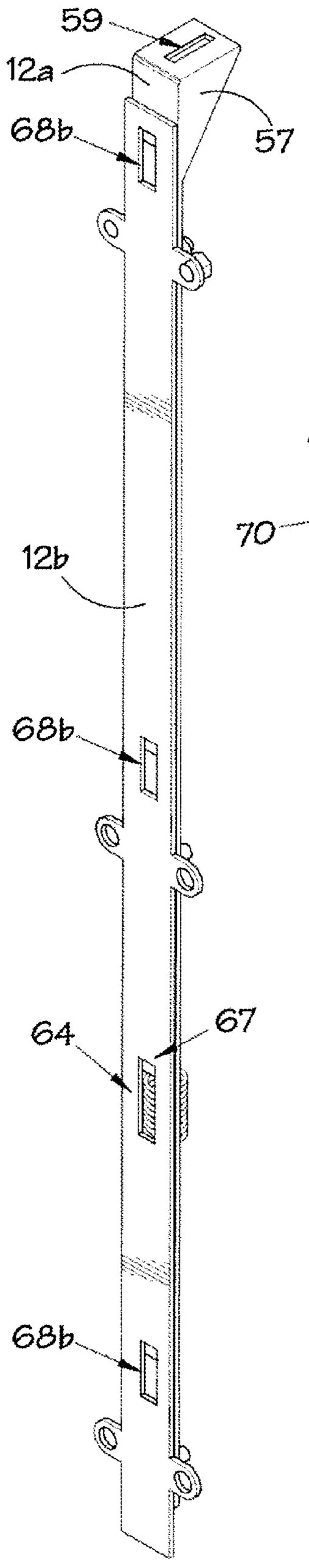

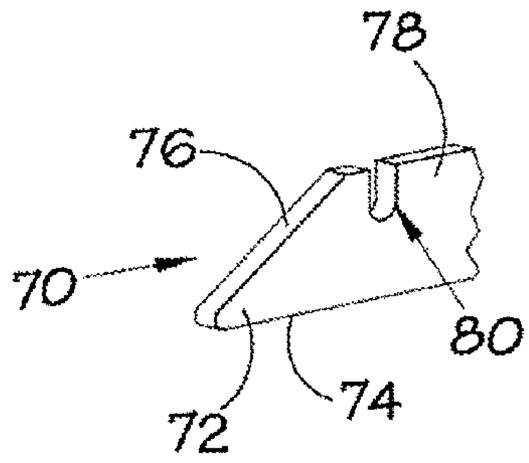

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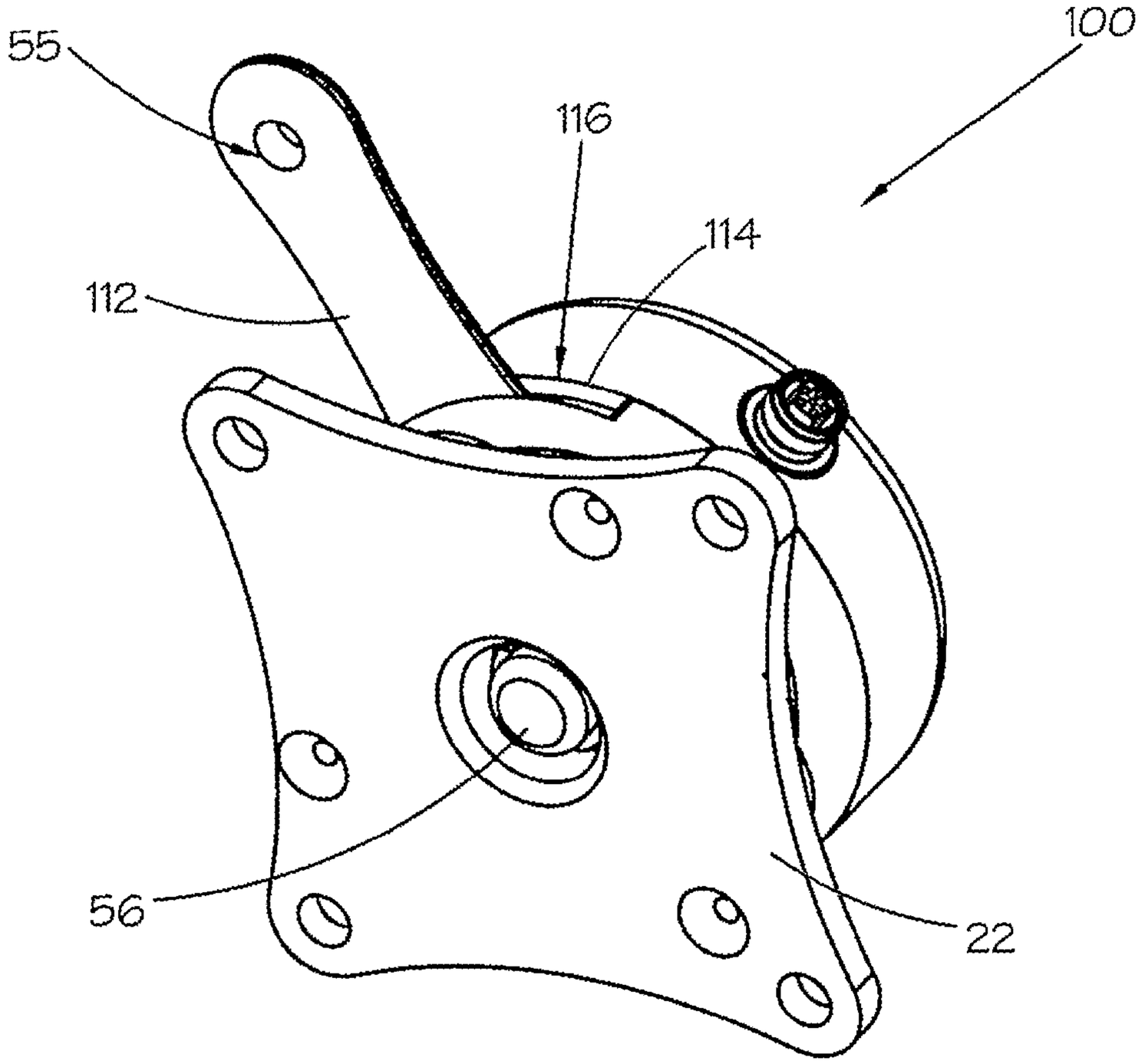

Figure 12

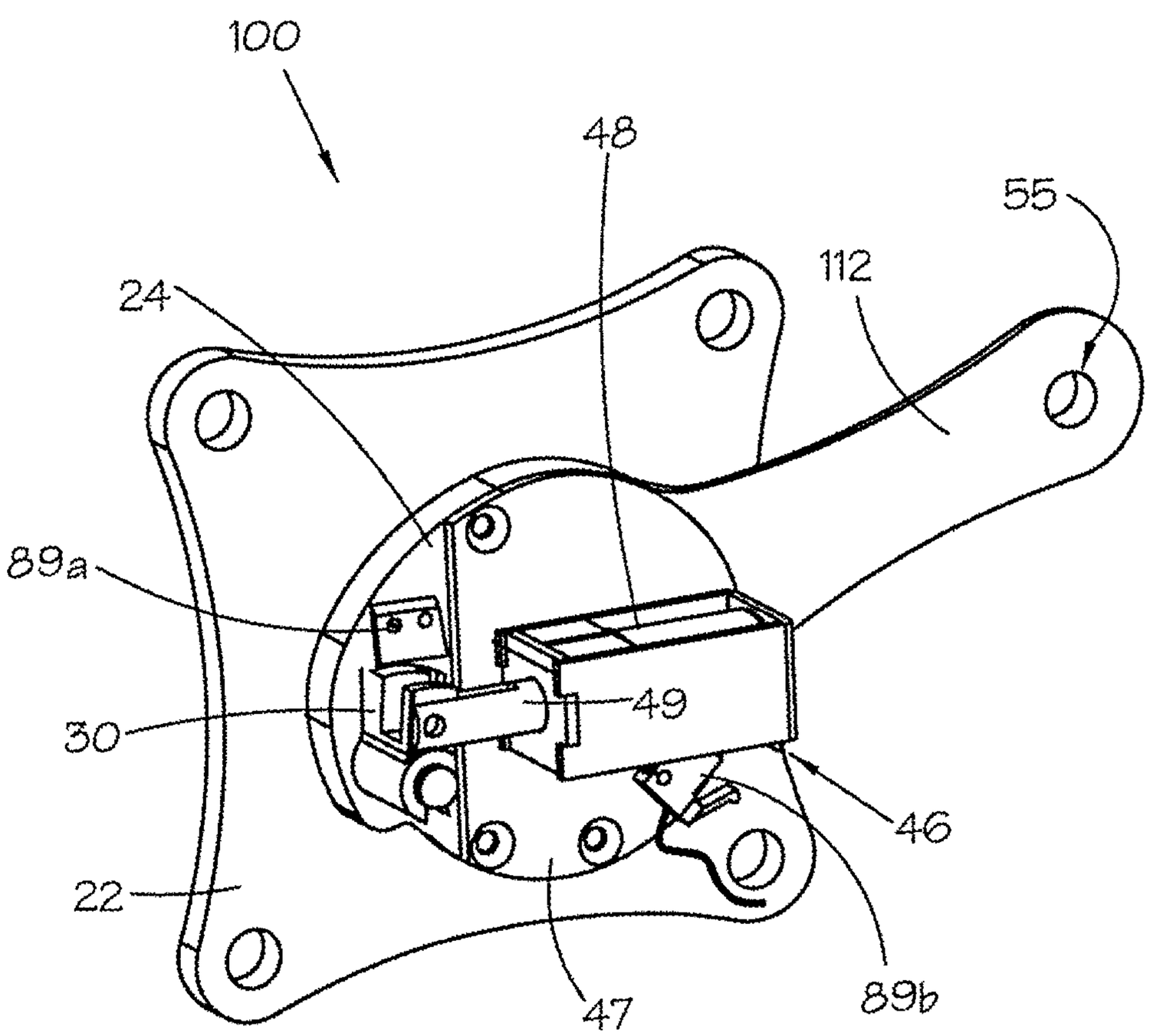

Figure 13

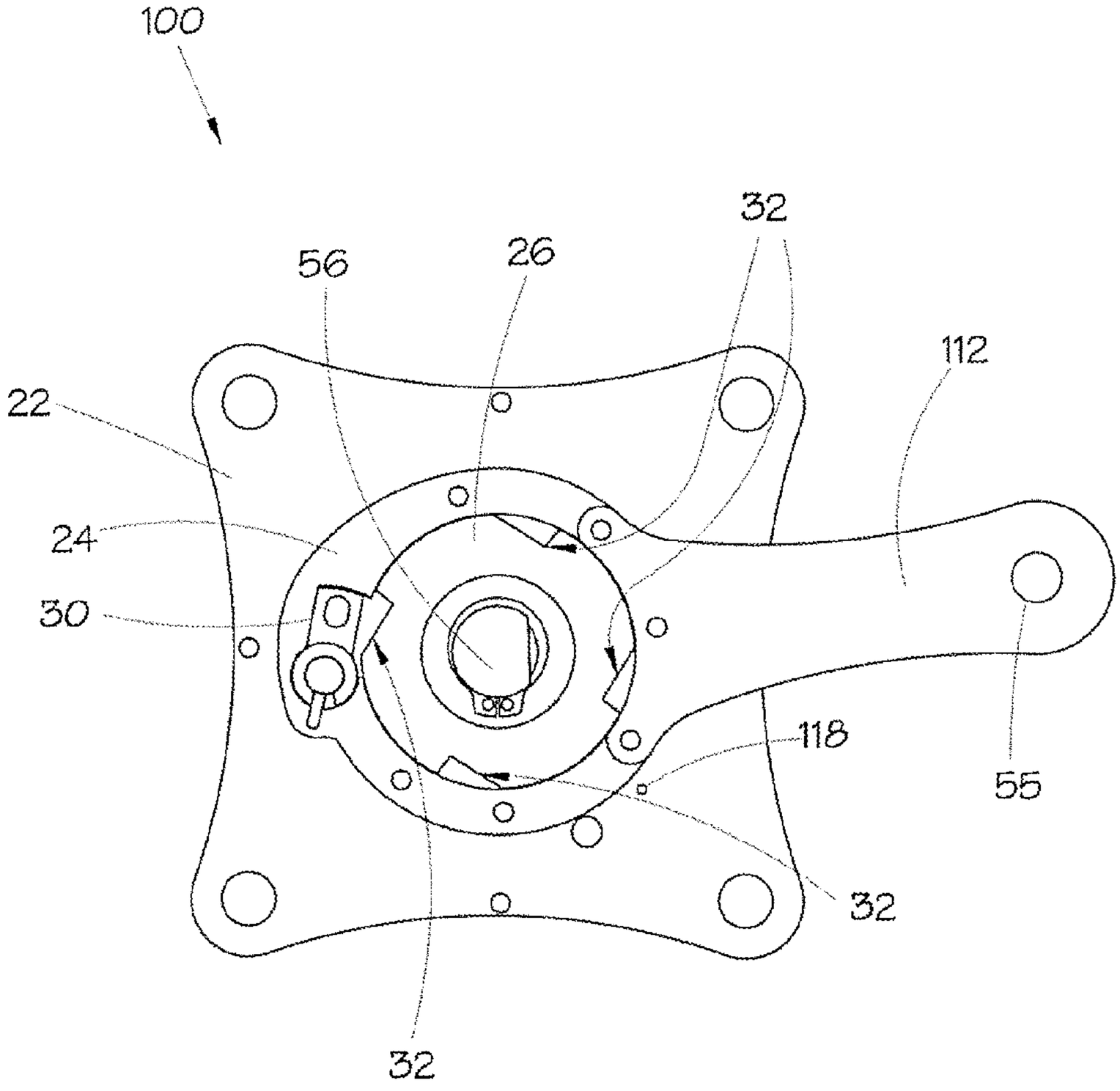

Figure 14

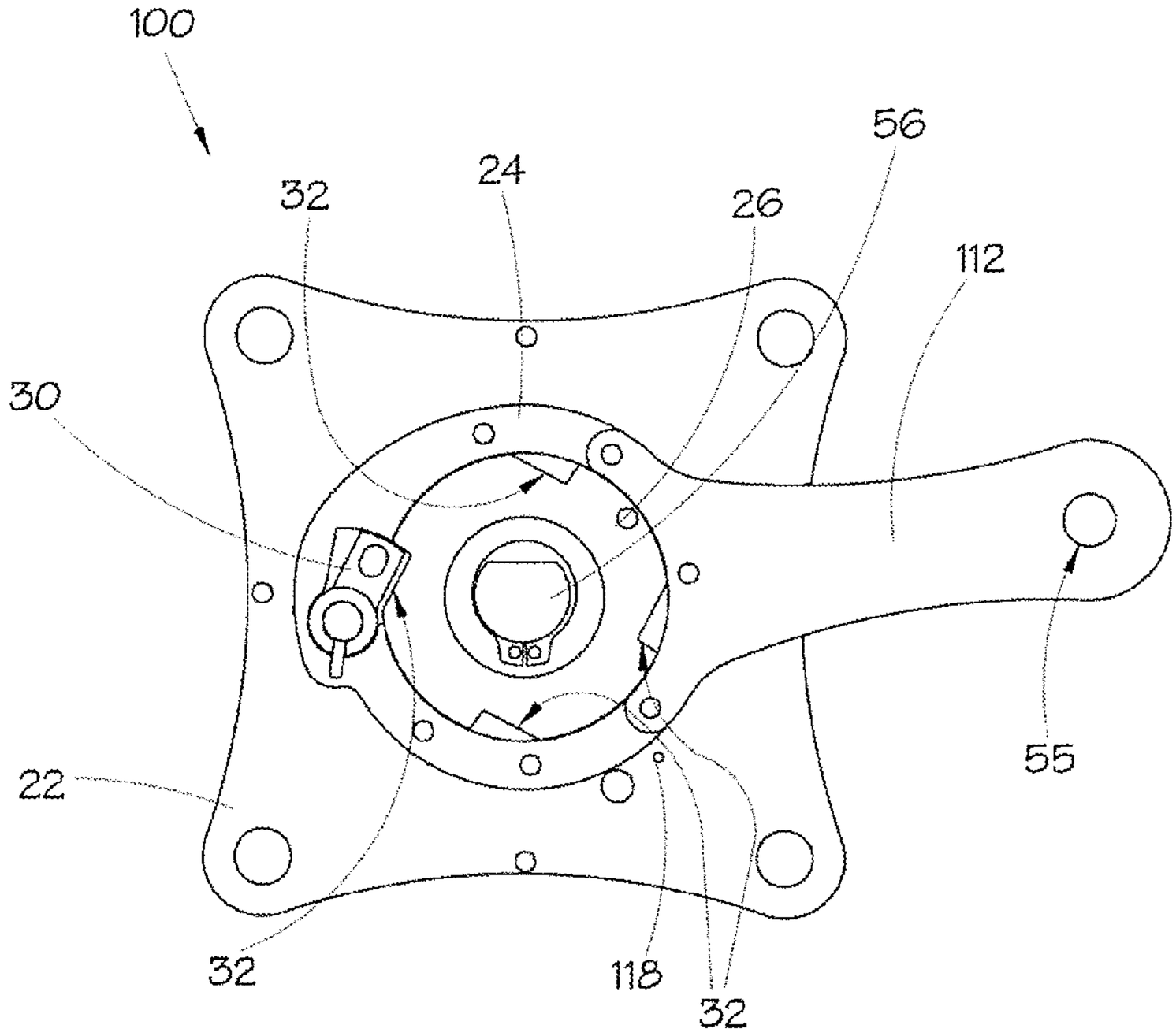

Figure 15

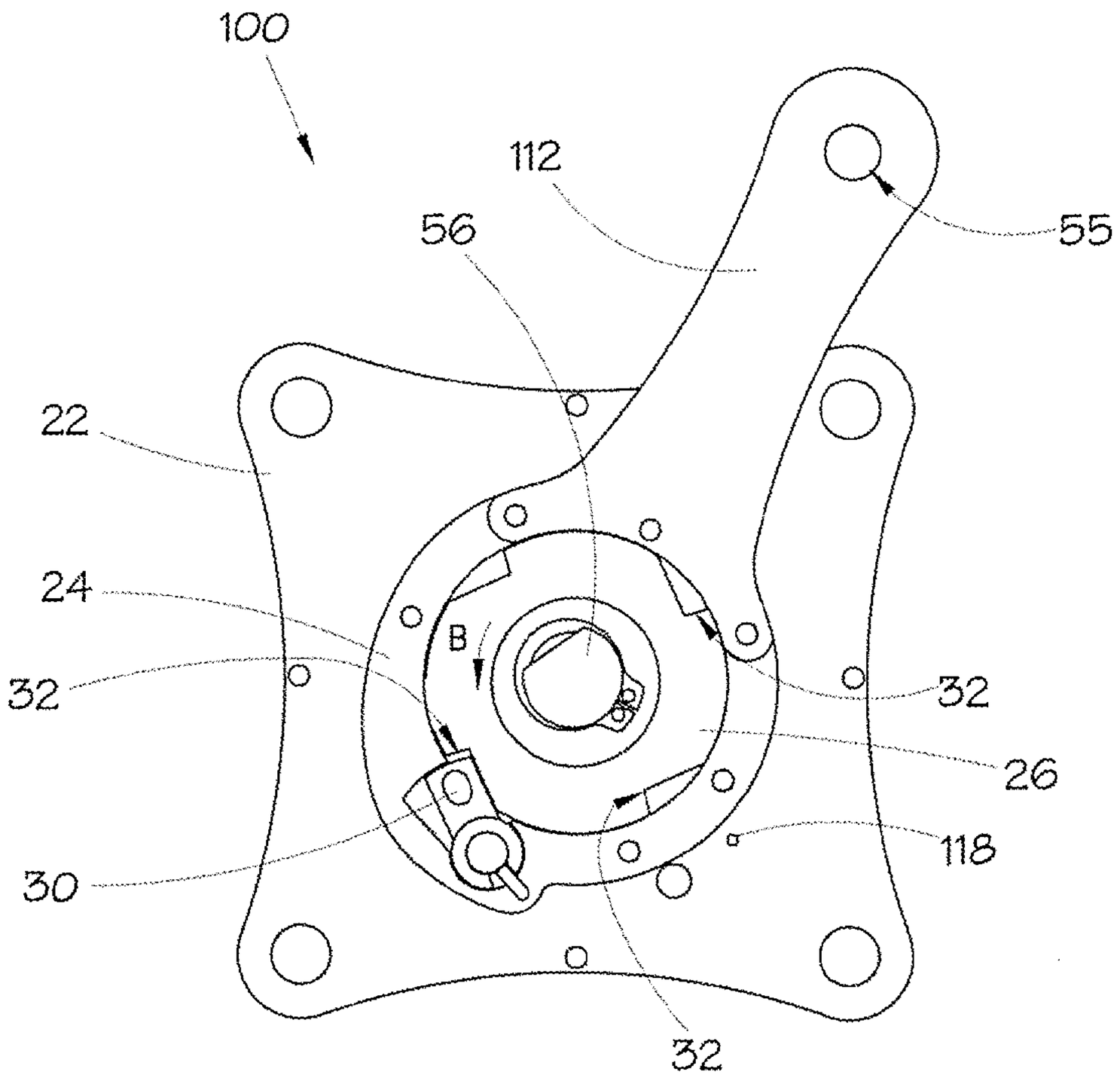

Figure 16

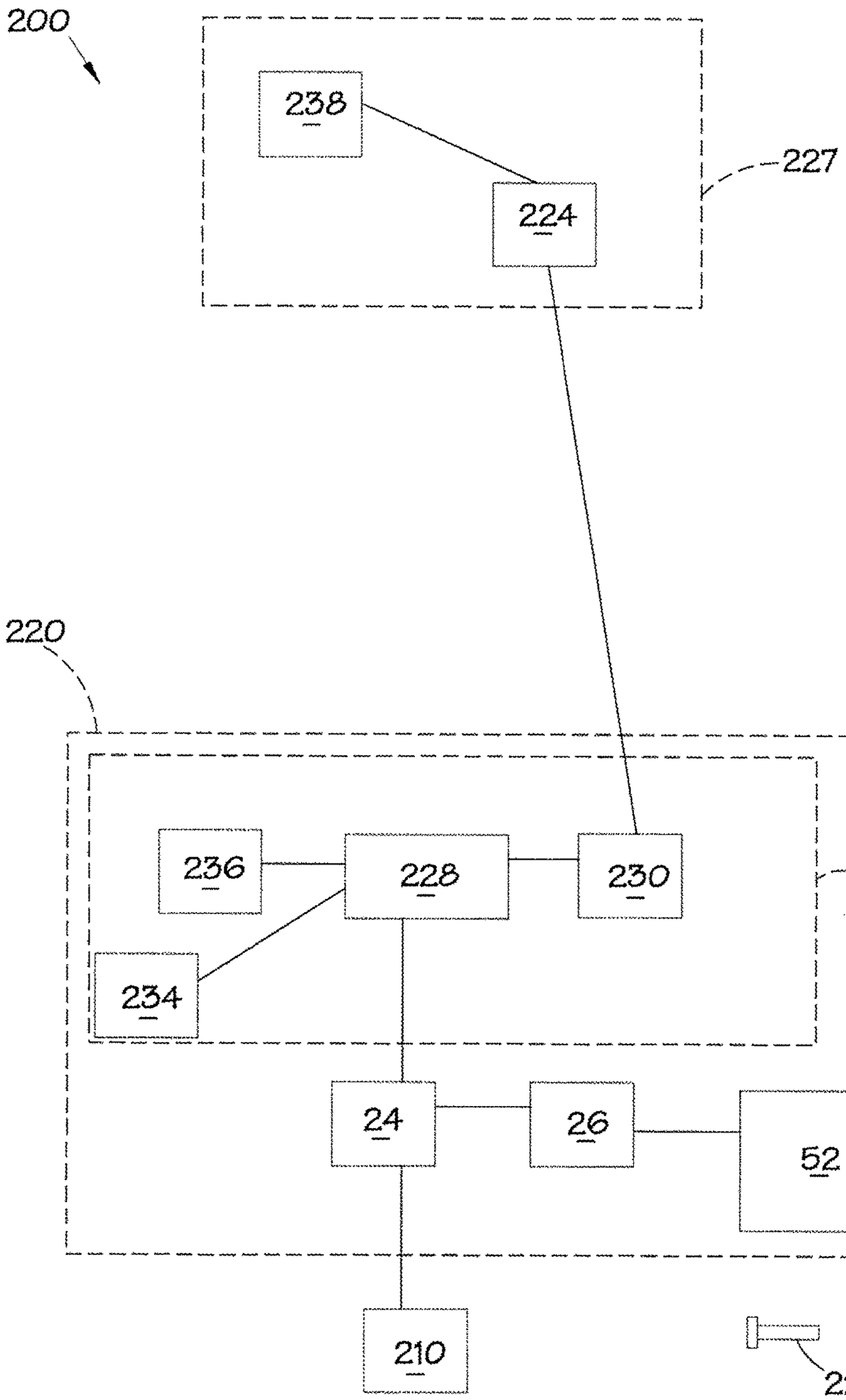

Figure 17

ACTUATING ASSEMBLY FOR A LATCHING SYSTEM

BACKGROUND

The present invention relates to an actuating assembly, in particular to an actuating assembly to operate a displaceable component (e.g. a keeper plate) of a latching system between operative and inoperative conditions in response to a signal received via an electromagnetic signal (such as a signal from a telecommunications network).

Disengageable locks are known. For instance, CH446,108 "Tresorschloss" describes a lock wherein a first key actuates a link to engage an unlocking mechanism, and a second key causes the engaged unlocking mechanism to retract a lock bolt to an unlocked condition. Similar disengageable locks are described in DE433,321, DE503,560, DE4,441,834, GB2,206,638 "Electromechanical lock", GB2,313,148 "Locks", EP2,562,333 "Automotive and transportation control systems", WO 99/18311 "Closing device for a lock", US2014/0197920 "Methods of configuring and using a wireless communications device", U.S. Pat. No. 3,785,188 "Magnetic controlled door lock", U.S. Pat. No. 4,580,424 "Single lever, double changeable safe deposit lock", U.S. Pat. No. 4,656,852 "Lock with a double locking mechanism for a safe, bank compartment or the like", U.S. Pat. No. 5,219,386 "Locker unit comprising a plurality of lockers" and U.S. Pat. No. 5,701,828 "Electronic security system".

Furthermore, disengageable locks that engage upon receipt of a remote signal are known. For instance, EP0168884 "Locks" describes a key-releasable lock with a link incorporated in the unlocking mechanism, which link is movable by an electromagnetic actuator in response to a signal received by the lock between: an engaged position, in which the key-releasable lock may be operated; and a disengaged position, in which the lock may not be retracted to an unlocked position. Similar arrangements are described in EP0231532 "A lock having an external bolt unlocking device", US2009/0049878 "Lock cylinder opening system and method" and U.S. Pat. No. 4,850,623 "Locking mechanisms".

A drawback of known system is that the disengageable latching system/lock may not be engaged by one of a group of roaming persons (irrespective of the location of such persons) and, after engagement, known disengageable locks do not automatically disengage after expiry of a predetermined time from receipt of a remote signal from a roaming person.

It is an object of the present invention to provide an actuating assembly for a latching system that addresses this drawback.

SUMMARY OF THE INVENTION

According to a preferred embodiment of the present invention there is provided an actuating assembly to operate a displaceable component of a latching system, the actuating assembly includes:

a first member which is connected or connectable to the displaceable component of the latching system;

a second member, the first and second members being disconnectably connectable to each other, with the first and second members being in an inoperative configuration when they are disconnected from each other such that the second member is displaceable independently of the first member, and the first and second members being in an operative configuration when they are connected to each other such that displacement of the second member causes the first member to be displaced;

a first actuating sub-assembly including a first key receiver for receiving a non-mechanical first key in the form of a predetermined electromagnetic signal transmitted via a cellular telecommunications network;

a second actuating sub-assembly which is operable by a second key, the second actuating sub-assembly being operably connected to the second member and being configured, when actuated by the second key, to cause the second member to be displaced, thereby to cause the first member to be displaced when the first and second members are in their operative configuration; and

a timer for determining the time from receipt of a first key by the first actuating sub-assembly,

wherein the first actuating sub-assembly is configured, upon: (i) receipt of the first key, to cause the first and second members to assume their operative configuration; and (ii) elapse of a preset time measured by the timer from receipt of a first key by the first actuating sub-assembly, to cause the first and second members to assume their inoperative configuration.

In use, the first member may be directly connected or connectable to the displaceable component of the latching system, in which case an output drive member of the actuating assembly is provided by the first member. Instead, the first member may be indirectly connected or connectable to the displaceable component of the latching system, in which case the actuating assembly's output drive member, which may for example be or include a projecting element or arm connected or connectable to the displaceable component of the latching system, may be directly or indirectly connected to the first member, with displacement of the first member causing the output drive member to be displaced.

The latching system is typically for latching a closure member or door to a support structure on which the closure member or door is mounted. The support structure may be a static enclosure or a mobile enclosure. The enclosure may for example be a safe, electrical box, electrical sub-station, truck, delivery van or shipping container.

The first actuating sub-assembly may include a solenoid or an electric motor, e.g. a servomotor, or a linear actuator or an electromagnetic clutch for connecting the first and second members to each other.

In an embodiment of the invention, the first actuating sub-assembly includes a displaceable connecting component and a drive means, e.g. a solenoid, an electric motor or a linear actuator, which includes an output drive member which is connected to the connecting component, the connecting component being displaceable between a connecting position in which it connects the first and second members to each other and a non-connecting position in which it does not connect the first and second members to each other. The first actuating sub-assembly may include a non-mechanical key identification means, with the drive means being linked to the non-mechanical key identification means such that the drive means is operative in response to a signal received from the non-mechanical key identification means to cause displacement of the connecting component from its non-connecting position to its connecting position. The first actuating sub-assembly may be configured such that, after elapse of a preset time measured by the timer, the drive means is operative to cause displacement of the connecting component from its connecting position to its non-connecting position.

The first key, when in the form of an electromagnetic signal, may be encoded, with the key identification means including a decoder to decode the electromagnetic signal.

The actuating assembly may include a first key receiver for receiving the first key, when in the form of an electromagnetic signal.

The actuating assembly may include an electronic controller.

The actuating assembly may include location determining means for determining the location, e.g. the GPS co-ordinates, of the actuating assembly.

The actuating assembly may include storage means for storing an area or location, e.g. the GPS co-ordinates of a location, in which actuation of the first actuating sub-assembly is permitted.

The electronic controller may be configured to permit actuation of the first actuating sub-assembly only when the actuating assembly is at the location or within a specified distance from the location. Thus, for example, for applications where the actuating system is used to operate a component of a latching system for latching a closure member or door to a mobile enclosure, e.g. a motor vehicle, the actuating assembly may include storage means for storing a destination location, e.g. GPS co-ordinates, of the mobile enclosure, with the controller being configured to permit actuation of the first actuating sub-assembly only when the actuating assembly is within a specified distance from the destination location.

The actuating assembly may include a stored location management facility for managing, from a remote location, the area or location stored in the storage means in which actuation of the first actuating sub-assembly is permitted. Thus, with the stored location management facility, the area or location stored in the storage means may be inputted or modified from a remote location.

The actuating assembly may include real time location reporting means for real time reporting, e.g. by emitting a message via an electromagnetic signal to a remote location, on the location of the actuating assembly.

The actuating assembly may further include storage means for storing the co-ordinates of a desired route. The actuating assembly may include route deviation notifying means for notifying, e.g. by emitting a message via an electromagnetic signal to a remote location, when the location of the actuating assembly does not fall along the stored route. The actuating assembly may include a stored route management facility for managing, from a remote location, the route stored in the storage means. Thus, with the stored route management facility, the route stored in the storage means may be inputted or modified from a remote location.

The first actuating sub-assembly may be operably connected to at least one of the first member and the second member. In particular, at least one of the first and second members may include the displaceable connecting component, the connecting component being connected, e.g. pivotally connected, to the remainder of the first or second member, as the case may be, with the connecting component being receivable within a complementary receiving formation defined by the other member, thereby to connect the first and second members to each other. In an embodiment of the invention, the first member includes the connecting component and the second member defines at least one complementary receiving formation for receiving the connecting component, with the first actuating sub-assembly being operably connected to the connecting component so as to cause displacement of the connecting component from its non-connecting position to its connecting position in response to a signal received from the non-mechanical key identification means.

The first and second members may be rotatably displaceable such that, when the first and second members are in their operative configuration, rotary displacement of the second member causes rotary displacement of the first member.

The first member may define a circular aperture. The second member may be located within the aperture of the first member.

In an embodiment of the invention, the first member includes an outwardly projecting arm, with the arm being connected or connectable to the displaceable component of the latching system.

Instead, in another embodiment of the invention, the first member is connected to a linear toothed component, the linear, toothed component in effect providing, or being in the form of, a linear or rack gear, with the linear toothed component being connected or connectable to the displaceable component of the latching system. More particularly, the first member may have a toothed portion which extends at least partially around a periphery of the first member, with the toothed portion of the first member engaging with the toothed portion of the linear or rack gear.

In use, the actuating assembly may be installed on a door frame or surrounds. The displaceable component of the latching system to which the first member is connected may be a displaceable keeper plate which is connected to the door frame or surrounds in a manner such that a degree of displacement of the keeper plate relative to the door frame or surrounds is permitted, the keeper plate defining one or more apertures for receiving one or more latches mounted on the closure member or door. The or each latch may define an upwardly opening groove within which the displaceable keeper plate is captured by abutment of the keeper plate against a wall of the groove when the latch is in a latched position in which it is fast with the door frame or surrounds. Displacement of the first member may operate the latch to unlatch it by causing the displaceable keeper plate to be displaced upwardly so that it is no longer captured within the groove, thus permitting the or each latch to be withdrawn from the aperture of the displaceable keeper plate.

The second key may be a mechanical or non-mechanical key. In a preferred embodiment of the invention, the second actuating sub-assembly includes a mechanical lock mechanism which defines a passage or keyway for receiving a mating mechanical key. The second actuating sub-assembly may be configured to displace the second member when a mating key received in the passage or keyway is rotated. For example, the second actuating sub-assembly may include a drive member which is operably connected to the second member, with the lock mechanism being configured to displace the drive member, with displacement of the drive member causing the second member to be displaced. Instead, the second member may be a drive member of the lock mechanism, the lock mechanism being configured to displace the drive member when a mating key received in the passage or keyway is rotated.

The invention extends to a security system which includes:

a latching system to latch a door to surrounds of the door;

an actuating assembly to operate a displaceable component of the latching system to latch or unlatch the door, the actuating assembly including:

a first member which is connected or connectable to the displaceable component of the latching system;

a second member, the first and second members being disconnectably connectable to each other, with the first and second members being in an inoperative configuration when they are disconnected from each other such that the second member is displaceable independently of the first member, and the first and second members being in an operative configuration when they are connected to each other such that displacement of the second member causes the first member to be displaced; a first actuating sub-assembly which is operable by a first key and is configured, when actuated by the first key, to cause the first and second members to assume their operative configuration, and

a second actuating sub-assembly which is operable by a second key, the second actuating sub-assembly being operably connected to the second member and being configured, when actuated by the second key, to cause the second member to be displaced, thereby to cause the first member to be displaced when the first and second members are in their operative configuration;

a first key emitter for emitting a first key to operate the first actuating sub-assembly, the first key being in the form of an electromagnetic signal; and

a second key to operate the second actuating sub-assembly.

The latching system may be as hereinbefore described.

The first and second keys may be as hereinbefore described.

The latching system is typically for latching a closure member or door to a support structure on which the closure member or door is mounted. The support structure may be a static enclosure or a mobile enclosure. The enclosure may for example be a safe, electrical box, electrical sub-station, truck, delivery van or shipping container.

The security system may include storage means for storing an area or location, e.g. the GPS co-ordinates of a location, in which actuation of the first actuating sub-assembly is permitted. The storage means may be proximate to, or part of, the actuating assembly or may be remote from the actuating assembly.

The actuating assembly may include an electronic controller.

The security system may include location determining means for determining the location, e.g. the GPS co-ordinates, of the actuating assembly.

The security system may include storage means for storing an area or location, e.g. the GPS co-ordinates of a location, in which actuation of the first actuating sub-assembly is permitted.

The electronic controller may be configured to permit actuation of the first actuating sub-assembly only when the actuating assembly is at the location or within a specified distance from the location.

The security system may include a stored location management facility for managing, from a remote location, the area or location stored in the storage means in which actuation of the first actuating sub-assembly is permitted. Thus, with the stored location management facility, the area or location stored in the storage means may be inputted or modified from a remote location.

The security system may include real time location reporting means for real time reporting, e.g. by emitting a message via an electromagnetic signal to a remote location, on the location of the actuating assembly.

The security system may further include storage means for storing the co-ordinates of a desired route. The security system may include route deviation notifying means for notifying, e.g. by emitting a message via an electromagnetic signal to a remote location, when the location of the actuating assembly does not fall along the stored route. The security system may include a stored route management facility for managing, from a remote location, the route stored in the storage means. Thus, with the stored route management facility, the route stored in the storage means may be inputted or modified from a remote location.

The actuating assembly may be as hereinbefore described.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of examples only, with reference to the accompanying drawings in which:

FIG. **1** is a three-dimensional view of a first embodiment of an actuating assembly in accordance with the invention;

FIG. **2** is a three-dimensional exterior view of a support structure in which the actuating assembly of FIG. **1** is installed;

FIG. **3** is an interior view of a portion of the support structure of FIG. **2** showing the installed actuating assembly of FIG. **1**, and showing keeper plates of a latching system to which the actuating assembly is connected;

FIG. **4** is a face-on view of the actuating assembly of FIG. **1**, a portion of its housing having been removed for illustrative purposes;

FIG. **5** is another face-on view of the actuating assembly of FIG. **1**, with a portion of its housing, its solenoid and its solenoid mounting plate having been removed for illustrative purposes, showing rotatable first and second members of the lock in an inoperative configuration;

FIG. **6** is another face-on view of the actuating assembly of FIG. **1**, with a portion of its housing, its solenoid and its solenoid mounting plate having been removed for illustrative purposes, showing the first and second members in an operative configuration;

FIG. **7** is another face-on view of the portion of the actuating assembly of FIG. **1**, with a portion of its housing, its solenoid and its solenoid mounting plate having been removed for illustrative purposes, in which the first and second members are in an operative configuration, with the first and second members having been rotated from their positions in FIG. **6**;

FIG. **8** is a face-on view of the keeper plates of the latching system shown in FIG. **3**;

FIG. **9** is a side view of the keeper plates of the latching system shown in FIG. **3**;

FIG. **10** is a three-dimensional view of the keeper plates of the latching system shown in FIG. **3**;

FIG. **11** shows one of the latches of the latching system;

FIG. **12** is a three-dimensional view of a second embodiment of an actuating assembly in accordance with the invention;

FIG. **13** is a three-dimensional view of the actuating assembly of FIG. **12**, with a portion of its housing having been removed for illustrative purposes;

FIG. **14** is a face-on view of the actuating assembly of FIG. **12**, with a portion of its housing, its solenoid and its solenoid mounting plate having been removed for illustrative purposes, showing rotatable first and second members of the lock in an inoperative configuration;

FIG. **15** is a face-on view of the actuating assembly of FIG. **12**, with a portion of its housing, its solenoid and its

solenoid mounting plate having been removed for illustrative purposes, showing the first and second members in an operative configuration;

FIG. **16** is a face-on view of the actuating assembly of FIG. **12**, with a portion of its housing, its solenoid and its solenoid mounting plate having been removed for illustrative purposes, in which the first and second members are in an operative configuration, with the first and second members having been rotated from their positions in FIG. **15**; and

FIG. **17** is a schematic block diagram illustrating a security system in accordance with the invention.

DESCRIPTION OF THE INVENTION

Referring to FIGS. **1** to **11**, a first embodiment of a lock in accordance with the invention is generally designated by reference numeral **10**.

Referring to FIGS. **1** to **11**, a first embodiment of an actuating assembly in accordance with the invention is generally designated by reference numeral **10**. The actuating assembly **10** is for operating a displaceable keeper plate **12***a* of a latching system **14**, a portion of which is shown in FIG. **3**. It will, however, be appreciated that the actuating assembly **10** could instead operate a wide variety of other kinds of latching systems (not shown).

The latching system **14** includes a pair of keeper plates **12***a*, **12***b* (see FIG. **9**) and three latches **70** (one of which is shown in FIG. **11**). The keeper plate **12***a* is connected to the keeper plate **12***b* as is more fully described below. As shown in FIGS. **2** and **3**, the keeper plate **12***b* is affixed to a door surrounds **16** of a support structure **20** which includes a closure member or door **18**. In this example the support structure **20** is a safe like enclosure. The door **18** is hinged on a side thereof (not shown) to the safe **20**, e.g. by means of multi-pivot point hinges which each include a plurality of pivot pins arranged in series.

The actuating assembly **10** includes a body or housing **22**, a first member **24** and a second member **26** (as best seen in FIGS. **5** to **7**).

The first member **24** is annular, the first member **24** defining a central, circular aperture **28**. The second member **26**, which is also annular, is located within the aperture **28**. The second member **26** is co-axial with the first member **24**. The first member **24** includes a pivotable connecting component **30**. The second member **26** defines on its periphery a plurality of circumferentially spaced receiving formations **32** which are in the form of notches. The connecting component **30** is receivable within the receiving formations **32**, the first and second members **24**, **26** being connected to each other when the connecting component **30** is received in one of the receiving formations **32**, reminiscent of a ratchet comprising a gear and a pawl, but with the pawl not being biased towards the gear.

The first member **24** is also connected to a linear toothed component **34**, the linear, toothed component **34** in effect providing, or being in the form of, a linear or rack gear. The first member **24** has a toothed portion **36** (shown in FIG. **5**) which extends partially around the circumference of the first member **24**, with teeth **38** (shown in FIG. **5**) of the first member **24** engaging with teeth **40** of the linear or rack gear **34**. The linear or rack gear **34** is affixed to a sliding plate **42**, which is slidably connected to the housing **22**, a rear side of the sliding plate **42** defining longitudinally extending parallel grooves (not shown) in which complementary, parallel ribs **43** defined by the housing **22** are received. The sliding plate **42** includes a projecting arm **44** at an operatively lower end thereof which is connected to the latching system **14**.

As best seen in FIG. **4**, the actuating assembly **10** includes a first actuating sub-assembly **46** which is operable by a first key, the first key being a non-mechanical key in the form of an identifying electromagnetic signal. The identifying electromagnetic signal is transmitted by a cellular telecommunications network, and can be triggered by a cellular telephone. Alternatively, the signal could be emitted by a remote control device (not shown). The first actuating sub-assembly **46** includes a non-mechanical key identification means (not shown) for identifying the signal. The first actuating sub-assembly **46** includes a solenoid **48** (FIG. **4**) which is mounted on the first member **24** via a plate **47**. The solenoid **48** is connected to the connecting component **30** via an output drive shaft **49** of the solenoid **48**. The solenoid **48** is linked to the non-mechanical key identification means such that it is operative, in response to the signal, to cause the drive shaft **49** to be displaced such that the connecting component **30** is pivoted in a direction towards the second member **26** so that the connecting component **30** is received in one of the receiving formations **32** defined on the circumference of the second member **26**, thereby to connect the first and second members **24**, **26** to each other.

The actuating assembly **10** also includes a second actuating sub-assembly which includes a mechanical lock mechanism (not shown) and a drive member **56**, the lock mechanism being accessible via a keyhole **54** (FIG. **2**). The lock mechanism (not shown) defines a passage or keyway (not shown) for receiving a mating mechanical key (not shown). The drive member **56** is co-axial with the annular second member **26**, with the second member **26** being rotatably fast with the drive member **56**. The lock mechanism (not shown) is configured to rotatably displace the drive member **56**, with said displacement of the drive member **56** causing the second member **26** to be rotatably displaced.

As best seen in FIG. **3**, a connecting member **53** connects the arm **44** of a connecting formation **57** at an upper end of the keeper plate **12***a* of the latching system **14**. In particular, the connecting member **53** is threaded through an aperture **55** defined in the arm **44** and extends through an elongate opening **59** defined in a top of the connecting formation **57**. The top of the connecting formation **57**, i.e. on opposite sides of the opening **59**, is supported on a lower end of the connecting member **53**. The keeper plate **12***b* includes lugs which are fastened to the door surrounds **16**. The displaceable keeper plate **12***a* is connected to the keeper plate **12***b* via fasteners **60** which are received in elongate slots **62** (FIGS. **3** and **8**). Furthermore, a coil spring **64** is captured between a pair of operatively lower and upper L-shaped arms **66***a* and **66***b* (FIG. **9**). The arm **66***a* is defined by the keeper plate **12***a*. The arm **66***b* is defined by the keeper plate **12***b* and extends through an aperture **67** defined by the keeper plate **12***a*, the top of the aperture **67** being adjacent the arm **66***b*.

The keeper plate **12***a* defines three vertically spaced, latch-receiving apertures **68***a*, and the keeper plate **12***b* defines three vertically spaced, latch-receiving apertures **68***b*. The door **18** includes three vertically spaced latches **70** (one of which is shown in FIG. **11**) which are fixedly attached to the door **18** and are receivable by the apertures **68***a*, **68***b*. Each latch **70** has a tapered end portion **72** which is generally triangular in profile and includes a horizontally extending bottom **74** and an upwardly inclined side **76**. The latch **70** is affixed to the door **18** via a widened portion **78** of the latch **70**. The portion **78** defines an upwardly opening groove **80** which extends transversely through the latch **70**. As shown in FIGS. **3** and **8**, prior to the insertion of the

latches **70** in the apertures **68***a*, **68***b*, the apertures **68***b* are partially in register with the apertures **68***a* (the apertures **68***a*, **68***b* being slightly vertically offset), with the bottom wall or floor **84***b* of the apertures **68***b* being slightly above the bottom walls or floors **84***a* of the apertures **68***a*, and with the apertures **68***a*, **68***b* being sufficiently in register to permit the tip of the tapered end portion **72** of each latch **70** to extend through one of the pairs of partially registering apertures **68***a*, **68***b*. The apertures **68***b* of the keeper plate **12***b* are in register with vertically spaced apertures **86** defined in the door surrounds **16**.

In use, when the door **18** is latched to the door surrounds **16**, the keeper plate **12***a* is captured between the walls of the grooves **80** of the latches **70**, abutment of the keeper plate **12***a* against the walls of the grooves **80** inhibiting unlatching and displacement of the door **18**, and the first member **24** and second member **26** are in their disconnected, inoperative configuration shown in FIGS. **4** and **5**. When the first and second members **24**, **26** are disconnected from each other, displacement of the second member **26** does not cause the first member **24** to be displaced. When the door **18** is required to be unlatched, the actuating assembly **10** is used to displace the keeper plate **12***a* upwardly so that the apertures **68***a* are entirely in register with the apertures **68***b* as described below.

In particular, to connect the first member **24** to the second member **26** so that the first and second members **24**, **26** assume their operative configuration, the first actuating sub-assembly **46** is activated by means of the electromagnetic signal from a cellular telecommunications network or a remote control device (not shown). The signal is detected by the key identification means (not shown) and, if there is a positive identification by the key identification means that the signal is the correct signal, the solenoid **48** is activated to displace its drive shaft **49** so as to cause the connecting component **30** to pivot towards the second member **26** so that the connecting component **30** is received in the neighbouring receiving formation **32**, thereby connecting the first and second members **24**, **26** to each other, as shown in FIG. **6**.

Thereafter, a mating mechanical key (not shown) is inserted via the keyhole **54** into the passage or keyway (not shown) of the lock mechanism (not shown) so that the key engages with elements (not shown) of the lock mechanism such that rotation of the key causes the drive member **56** to rotate in the direction of arrow "A" in FIG. **6**. The rotation of the drive member **56** causes the second member **26** and the first member **24** to rotate with it. The teeth **38** of the first member **24** mesh with the teeth **40** of the linear or rack gear **34**, which causes the first member **24** to be linearly upwardly displaced until it reaches the position shown in FIG. **7**. The actuating assembly includes two limit switches **88***a*, **88***b* for detecting the position of the sliding plate **42** and thus whether the actuating assembly **10** is in a locked or unlocked condition. When the arm **44** is in its lowered position shown in FIGS. **4** to **6**, the sliding plate **42** closes the limit switch **88***a*. When the arm **44** is in its raised position shown in FIG. **7**, the sliding plate **42** closes the limit switch **88***b*. The limit switches **88***a*, **88***b* are connected to an electronic controller (not shown), which in turn is connected to a display panel (not shown), for indicating whether the actuating assembly **10** is in a locked or unlocked condition.

As soon as the mechanical key is released from its unlocking position, biasing means in the form of a spring (not shown), causes the first and second members **24**, **26** to disengage from each other. This allows sliding plate **42** to return to its biased locked position under the influence of the biasing means in the form of the aforementioned spring (not shown) and the spring **64**. This causes the linear or rack gear **34** and the arm **44** to be automatically lowered.

As the arm **44** of the first member **24** is upwardly displaced, the keeper plate **12***a* is drawn upwardly with it, against the urging of the coil spring **64**. When the first member **24** has reached its uppermost position shown in FIG. **7**, the apertures **68***a* are entirely in register with the apertures **68***b*, and thus also with the apertures **86** of the door surrounds **16**. Since in this position the keeper plate **12***a* is no longer captured between the walls of the grooves **80**, the latches **70** can then be withdrawn from the keeper plates **12***a*, **12***b* and the door surrounds **16** so that the door **18** can be opened. The arm **44** thus acts as a linear output drive member of the actuating assembly **10**.

When the door **18** is closed, the latches **70** are inserted into the apertures **86**, **68***a* and **68***b*, the keeper plate **12***a* being pushed upwardly by the tapered end portions **72** of the latches **70**, until the grooves **80** reach the keeper plate **12***a*, whereafter the coil spring **64** urges the keeper plate **12***a* downwardly into the grooves **80**. In this position, the keeper plate **12***a* is captured within the grooves **80**. For the unlatching of the latches **70**, actuation of the actuating assembly **10**, as described above, is required.

Referring to FIGS. **12** to **16**, a second embodiment of an actuating assembly in accordance with the invention is generally designated by reference numeral **100**. Unless otherwise indicated, like features to those of the actuating assembly **10** are designated by like reference numerals.

The actuating assembly **100** is similar to the actuating assembly **10** save that, instead of there being a linear or rack gear **34** and a sliding plate **42** with its projecting arm **44**, an output drive member of the actuating assembly **100** is a projecting arm **112** of the first member **24**. The arm **112** projects outwardly from an annular portion **114** of the first member **24** through a slot **116** defined by the housing **12**. When the first member **24** is rotatably displaced, the arm **112** is rotatably displaced along with the remainder of the first member **24**. It will be appreciated that the arm **112** provides a rotary output drive member for the actuating assembly **100**.

As previously mentioned, the limit switches **88***a* and **88***b* detect whether the actuating assembly **100** is in its locked or unlocked condition. The switch **88***a* is activated by movement of the connecting component **30** and indicates whether or not the connecting component **30** has been displaced by the output drive shaft **49** of the solenoid **48**, therefore indicating whether or not the first and second members **24** and **26** are connected. The switch **88***b* is activated by a pin **118** (shown in FIGS. **14** to **16**) that protrudes from the base of the housing **22**. The switch **88***b* is fast with the first member **24** and accordingly, when the first member **24** rotates, the switch **88***b* rotates with the first member **24**. Thus, the switch **88***a* can detect whether or not the first and second members **24**, **26** are in their operative configuration and the switch **88***b* can detect whether or not the first member **24** is in its home or locking position shown in FIGS. **13** to **15**.

In use, for connecting the first member **24** to the second member **26** so that the first and second members **24**, **26** assume their operative configuration shown in FIG. **15** from their inoperative configuration shown in FIG. **14**, the first actuating sub-assembly **46** is activated by means of the electromagnetic signal from the cellular telecommunications network or the remote control device (not shown). The signal is detected by the key identification means (not shown) and, if there is a positive identification by the key

identification means that the signal is the correct signal, the solenoid **48** is activated to displace its output drive shaft **49** so as to cause the connecting component **30** to pivot towards the second member **26**. In particular, the connecting component **30** pivots from the position shown in FIG. **14** towards the second member **26** so that the connecting component **30** is received in a neighbouring receiving formation **32**, thereby connecting the first and second members **24**, **26** to each other, as shown in FIG. **15**.

Thereafter, a mating mechanical key (not shown) is inserted in the passage or keyway (not shown) of the lock mechanism (not shown) so that it engages with elements (not shown) of the lock mechanism such that rotation of the key causes the drive member **56** to rotate in the direction of arrow "B" in FIG. **16**. The rotation of the drive member **56** causes the second member **26** and the first member **24** to rotate with it so that the arm **112** also rotates. In use, the arm **112** will be connected to a latching system (not shown) that requires a rotary output drive member. Once the mechanical key is released from its unlocking position, biasing means in the form of a spring (not shown), causes the first and second members **24**, **26** to disengage from each other. This allows members **24**, **112** to return to their biased locked position due to the influence of the biasing means in the form of the aforementioned spring (not shown) in the assembly and any (optionally) further springs in the latching mechanisms.

When the first member **24** is in its home of locking position, the pin **118** and the switch **88***b* are aligned with each other and the switch **88***b* is positively activated. During the unlocking procedure, as the first member **24** rotates away from its locking position, the switch **88***b* rotates with it, thereby causing the switch **88***b* to be displaced away from the pin **118** that protrudes from the base of the housing **22**, thereby causing the state of the switch **88***b* to change from a positively activated state to an off or non-activated state.

Referring now to FIG. **17**, a security or locking system in accordance with the invention is generally designated by reference numeral **200**. Unless otherwise indicated, like features to those of the actuating assembly **10**, **100** are designated by like reference numerals.

The security system **200** includes a latching system **210** to latch a door (not shown) mounted on a mobile enclosure (not shown), to surrounds of the door (not shown), an actuating assembly **220** to operate a displaceable component (not shown) of the latching system **210** to latch or unlatch the door, a communications facility **224** which includes a first key emitter for emitting a first key and a second key **226**. In this example, the mobile enclosure is a motor vehicle. It will, however, be appreciated the security system **200** could be used with a wide variety of mobile enclosures. Access to a cargo area (not shown) of the motor vehicle (not shown) is controlled by means of the door (not shown) and the security system **200**. The first key is in the form of an electromagnetic signal. The second key **226** is a mechanical key.

The actuating assembly **220** is same as the actuating assembly **100** described above, save that it has certain further features as described below. In this embodiment of the invention, the latching system **210** requires a rotary output drive member. It will be appreciated, however, that in an alternative embodiment of the invention (not shown), where the latching system **210** requires a linear output drive member, the actuating assembly may instead for example be the actuating assembly **10**.

The first key is for operating the first actuating sub-assembly **46** of the actuating assembly **220**. The second key **226** is for operating the second actuating sub-assembly **52** of the actuating assembly **220**.

The communications facility **224** sends and receives electromagnetic signals and is part of a monitoring facility or installation **227** which is situated at a location remote from the motor vehicle. The first actuating sub-assembly **46** includes an electronic controller **228** and a communication means **230** for sending and receiving electromagnetic signals to enable communication with the remote installation **227**.

The actuating assembly **220** includes a location determining means **234** for determining the location, in particular the GPS co-ordinates, of the actuating assembly **220**, and hence of the motor vehicle (not shown) on which it is installed.

The actuating assembly **220** also includes a storage means **236** for storing various items of information as described below.

One of the items stored in the storage means **236** is the location, in particular the GPS co-ordinates, of a planned destination of the motor vehicle. Another item of information stored in the storage means **236** is the distance from the planned destination within which the motor vehicle must be for actuation of the first actuating sub-assembly **46** to be permitted, the permitted distance being 100 metres in one embodiment of the invention. The electronic controller **228** is programmed with software which calculates whether the location of the vehicle as determined by the location determining means **234** is within the permitted distance of the planned destination and, if so, it causes a message to be sent via the communication means **230** to the remote installation **227** that the motor vehicle is within the permitted distance. If the motor vehicle is within the permitted distance, this is indicated on a user interface **238** at the remote installation **227**. In this example, the user interface **238** includes a computer monitor whereby the position of the vehicle relative to the planned destination, i.e. whether or not the vehicle with within the permitted distance from the planned destination, and the status of the actuating assembly **220** (e.g. whether the first and second members **24**, **26** are in their operative, i.e. connected, configuration and whether or not the first member **24** is in its home or locking position) is displayed. Instead, in an alternative embodiment of the invention (not shown), there could instead be a control panel with differently coloured lights for indicating the position of the vehicle relative to the planned destination and for indicating the status of the actuating assembly **220**. The storage means **236** also stores the planned route of the motor vehicle to the destination.

The controller **228** includes a timer (not shown) and is programmed such that, after elapse of a preset time, e.g. elapse of 5 minutes measured by the timer, the solenoid **48** (shown in FIG. **13**) causes displacement of the connecting component **30** (shown in FIGS. **14** to **16**) from its connecting position to its non-connecting position. It is possible to achieve the uncoupling either: (i) by the controller **228** sending a signal for the solenoid to push (i.e. reverse direction) thereby disengaging element **30**, **26**; or (ii) by the controller **228** stopping the electromagnetic signal to the solenoid and by the biasing influence exerted by springs (not shown) displacing element **30** back into its natural inoperative configuration. The preset time is stored in the storage means **236**. Accordingly, elapse of a preset time measured by the timer from receipt of a first key by the first actuating sub-assembly causes the first and second members to assume their inoperative configuration.

The controller **228** is programmed with software to provide a management facility whereby the planned destination and the planned route stored in the storage means **236** can be inputted or modified from the remote installation **227**.

The controller **228** is also programmed with software which causes the actual location of the actuating assembly **220** obtained from the location determining means **234** to be continuously reported via the communication means **230** to the remote installation **227**. The location determining means **234** and the programmed controller **228** thus provide the actuating assembly **220** with a real time location reporting means for real time reporting on the location of the motor vehicle (not shown).

The controller **228** is also programmed with software which compares the actual location of the motor vehicle with the planned route, the actual location being obtained from the location determining means **234**. If there is a discrepancy between the actual location and the planned route, the programmed controller **238** causes a notification to be sent via the communicating means **230** to the remote location **232** that the actual route of the motor vehicle (not shown) does not conform with the planned route. The locating determining means **234** and the programmed controller **228** thus provide a route deviation notifying means for notifying the remote installation **227** when the actual route of the motor vehicle (not shown) does not conform with the planned route.

As described above with reference to the actuating assembly **100**, the actuating assembly **220** includes limit switches **89***a*, **89***b*, the switch **89***a* for detecting displacement of member **30** and thus the engagement between first and second members **24** and **26**. The actuating assembly **220** also includes sensing means (not shown) to detect whether the actuating assembly **220** has been struck by lightning and whether the locking mechanism of the second actuating sub-assembly **52** has been tampered with, e.g. if the second member **26** has been rotated without the first member **24** having been rotated indicating that an attempt had been made to unlock the locking mechanism when the first and second members **24**, **26** were in their inoperative configuration. The switches **89***a*, **89***b* and the sensing means are connected to the controller **228**.

The controller **228**, by means of input from the switches **89***a*, **89***b*, can detect whether or not the actuating assembly **220** is in a locked condition, i.e. the condition in which the first and second members **24**, **26** are in their inoperative configuration and the first member **24** is in its home or locking position. The controller **228** can then cause a message to be sent to the remote installation **227** indicating the condition of the actuating assembly **220** in this regard so that the display panel of the user interface **238** can display whether the actuating assembly **220** is in a locked or unlocked condition. If the sensing means (not shown) detects that the actuating assembly **220** has been struck by lightning or that the locking mechanism of the second actuating sub-assembly **52** has been tampered with, the controller **228** causes a message to be sent to the remote installation **227** which results in a warning message being displayed on the display panel of the user interface **238**.

In use, prior to the departure of the motor vehicle to deliver cargo to a planned destination, the planned destination and the planned route are inputted via the user interface **238** at the remote installation **227** into the storage means **236** of the first actuating sub-assembly **46**. The door to the cargo area of the vehicle is latched to its surrounds by means of the latching system **210**. Once the door is latched, it cannot be unlatched without actuation of the actuating system **220**.

Once the motor vehicle has arrived at its destination, the driver telephones the remote installation **227** to request actuation of the first actuating sub-assembly **46**. If the motor vehicle is within the permitted distance from the planned destination, this is indicated on the display panel of the user interface **238** at the remote installation **227**. If the display panel indicates that the vehicle is within the permitted distance from the planned destination, an operator at the remote installation **227** causes a first electronic key for the first actuating sub-assembly **47** to be sent via the communication facility **224** to the actuating assembly **220** for actuation of the first actuating sub-assembly **46**, i.e. the solenoid **48** (shown in FIG. **13**) causes displacement of the connecting component **30** (shown in FIGS. **14** to **16**) from its connecting position to its non-connecting position, thereby to cause the first and second members **24**, **26** to assume their operative configuration (shown in FIG. **15**).

Once the first and second members **24**, **26** are in their operative configuration, the driver can unlatch the latching system **210** by insertion of a mating mechanical key **226** into the passage of the locking mechanism of the second actuating sub-assembly **52** and rotationally displacing the key **226**. As described above with reference to the actuating assembly **100**, the rotational displacement of the key **226** causes the drive member **56** of the locking mechanism to rotate, which in turn causes the second member **26** and the first member **24** also to rotate, with the arm **112** rotating with the remainder of the first member **24** and causing the latching system **210** to unlatch.

As described above, the switch **89***b* can detect whether or not the first member **24** has been displaced from its home or locking position. If the actuating assembly **220** is not unlocked, i.e. if the first member **24** is not displaced away from its home or locking position, within five minutes of the receipt by the first actuating sub-assembly **46** as measured by the timer (not shown), the solenoid **48** causes displacement of the connecting component **30** from its connecting position to its non-connecting position. As previously mentioned, it is possible to achieve the uncoupling either: (i) by the controller **228** sending a signal for the solenoid to push (i.e. reverse direction) thereby disengaging element **30**, **26**; or (ii) by the controller **228** stopping the electromagnetic signal to the solenoid and by the biasing influence exerted by springs (not shown) displacing element **30** back into its natural inoperative configuration. In other words, elapse of a preset time measured by the timer from receipt of a first key by the first actuating sub-assembly causes the first and second members to assume their inoperative configuration. Unlocking of the actuating assembly **220** is then no longer possible until the first key is again sent from the remote installation **227** to the actuating assembly **220**.

As mentioned above, whilst the motor vehicle is travelling, the real time location reporting means continuously reports on the location of the motor vehicle to the remote installation **227**. If the motor vehicle deviates from the planned route, the route deviation notifying means notifies the remote installation **227** of the deviation.

By means of the invention as illustrated and described, an actuating assembly **10**, **100** is provided which requires actuation by two keys (not shown) in order to displace its output drive member **44**, **112**. This can provide enhanced security when, in use, the actuating assembly **10**, **100** is connected to a latching system. The actuating assembly **10**, **100** can furthermore bear a significant amount of torque and load when compared to, for example, conventional actuating assemblies that are only electronically activated; however, the inclusion of the first actuating sub-assembly **46** in the actuating assembly **10**, **100** described above means that tampering with the lock mechanism resulting in rotary displacement of the second member **26** should not in itself cause unlatching since, without the first and second mem-

bers **24**, **26** being connected to each other, displacement of the second member **26** will not cause the first member **24** to be displaced, and thus the output drive member **44**, **112** will not be displaced.

Further, the security system **200** as illustrated and described can provide enhanced security which can be of particular use for cargo-carrying motor vehicles. In particular, before the locking mechanism can be unlocked with the key **226**, the actuating assembly **220** must receive a first electronic key from the remote installation **227**. Beneficially, the condition of the actuating assembly **220** and the location of the motor vehicle can be monitored from the remote installation **227**. In particular, an operator at the remote installation **227** can check whether the motor vehicle is within the permitted distance of an intended destination before sending the first key. This provides an additional safety measure which can help to prevent loss of cargo due to robbery or theft along the route since the operator can ensure that the motor vehicle is at the planned destination before sending the first key.

It will be appreciated that, since the first key is a predetermined electromagnetic signal transmitted by a cellular telecommunication network (i.e. may be triggered by a cellular telephone), the person that provides the first key may roam. Furthermore, by automatically causing the first and second members to assume their inoperative condition after lapse of a predetermined time from receipt of the first key by the first actuating sub-assembly, the actuating assembly is rendered more secure against tampering and unauthorised operation.

The invention claimed is:

1. An actuating assembly to operate a displaceable component of a latching system, the actuating assembly including:

a first member which is connected or connectable to the displaceable component of the latching system;

a second member, the first and second members being disconnectably connectable to each other, with the first and second members being in an inoperative configuration when they are disconnected from each other such that the second member is displaceable independently of the first member, and the first and second members being in an operative configuration when they are connected to each other such that displacement of the second member causes the first member to be displaced;

a first actuating sub-assembly including a first key receiver for receiving a non-mechanical first key in the form of a predetermined electromagnetic signal transmitted via a cellular telecommunications network;

a second actuating sub-assembly which is operable by a second key, the second actuating sub-assembly being operably connected to the second member and being configured, when actuated by the second key, to cause the second member to be displaced, thereby to cause the first member to be displaced when the first and second members are in their operative configuration; and

a timer for determining the time from receipt of the first key by the first actuating sub-assembly,

wherein the first actuating sub-assembly is configured, upon: (i) receipt of the first key, to cause the first and second members to assume their operative configuration; and (ii) elapse of a preset time measured by the timer from receipt of the first key by the first actuating sub-assembly, to cause the first and second members to assume their inoperative configuration.

2. The actuating assembly according to claim **1**, wherein, in use, the first member is directly connected or connectable to the displaceable component of the latching system, and an output drive member of the actuating assembly is provided by the first member.

3. The actuating assembly according to claim **1** wherein the first member is indirectly connected or connectable to the displaceable component of the latching system, and an output drive member of the actuating assembly is directly or indirectly connected to the first member, with displacement of the first member causing the output drive member to be displaced.

4. The actuating assembly according to claim **3**, wherein the output drive member of the actuating assembly is or includes a projecting element or arm connected or connectable to the displaceable component of the latching system.

5. The actuating assembly according to claim **4** that is associated with: (i) a closure member or door; and (ii) a support structure on which the closure member or door is mounted, wherein the latching system is for latching the closure member or door to the support structure on which the closure member or door.

6. The actuating assembly according to claim **5**, wherein the support structure is a static enclosure or a mobile enclosure.

7. The actuating assembly according to claim **6**, wherein the enclosure is a safe, electrical box, electrical sub-station, truck, delivery van or shipping container.

8. The actuating assembly according to claim **7**, wherein the first actuating sub-assembly includes a displaceable connecting component and a drive means.

9. The actuating assembly according to claim **8**, wherein the drive means is a solenoid, an electric motor or a linear actuator, which includes the output drive member which is connected to the connecting component, the connecting component being displaceable between a connecting position in which it connects the first and second members to each other and a non-connecting position in which it does not connect the first and second members to each other.

10. The actuating assembly according to claim **9**, wherein the first actuating sub-assembly includes a non-mechanical key identification means, with the drive means being linked to the non-mechanical key identification means such that the drive means is operative in response to a signal received from the non-mechanical key identification means to cause displacement of the connecting component from its non-connecting position to its connecting position.

11. The actuating assembly according to claim **10**, further including: (i) an electronic controller; (ii) location determining means for determining the location or GPS co-ordinates of the actuating assembly; (iii) storage means for storing either a desired route or an area or location or GPS co-ordinates of a location, in which actuation of the first actuating sub-assembly is permitted; (iv) real time location reporting means for real time reporting via emission of a message via an electromagnetic signal to a remote location, on the location of the actuating assembly; and (v) route deviation notifying means for notifying when the location of the actuating assembly does not fall along the stored route.

12. The actuating assembly according to claim **11**, wherein the electronic controller is configured to permit actuation of the first actuating sub-assembly only when the actuating assembly is at the location or within a specified distance from the location.

13. The actuating assembly according to claim 12, wherein the first actuating sub-assembly is operably connected to at least one of the first member and the second member.

14. The actuating assembly according to claim 13, wherein at least one of the first and second members includes the displaceable connecting component, the connecting component being connected, to the remainder of the first or second member, as the case may be, with the connecting component being receivable within a complementary receiving formation defined by the other member, thereby to connect the first and second members to each other.

15. The actuating assembly according to claim 14, wherein the first member includes the connecting component and the second member defines at least one complementary receiving formation for receiving the connecting component, with the first actuating sub-assembly being operably connected to the connecting component so as to cause displacement of the connecting component from its non-connecting position to its connecting position in response to the signal received from the non-mechanical key identification means.

16. The actuating assembly according to claim 15, wherein the first and second members are rotatably displaceable such that, when the first and second members are in their operative configuration, rotary displacement of the second member causes rotary displacement of the first member.

17. The actuating assembly according to claim 16, wherein: (i) the first member defines a circular aperture; and (ii) the second member is located within the aperture of the first member.

18. The actuating assembly according to claim 17, wherein the first member includes an outwardly projecting arm, with the arm being connected or connectable to the displaceable component of the latching system.

19. The actuating assembly according to claim 17, wherein the first member is connected to a linear toothed component, the linear, toothed component in effect providing, or being in the form of a linear or rack gear, with the linear toothed component being connected or connectable to the displaceable component of the latching system.

20. The actuating assembly according to claim 19, wherein the first member has a toothed portion which extends at least partially around a periphery of the first member, with the toothed portion of the first member engaging with the toothed portion of the linear or rack gear.

21. The actuating assembly according to claim 20, installed on a door frame or surrounds.

22. The actuating assembly according to claim 21, wherein the displaceable component of the latching system to which the first member is connected is a displaceable keeper plate which is connected to the door frame or surrounds in a manner such that a degree of displacement of the keeper plate relative to the door frame or surrounds is permitted, the keeper plate defining one or more apertures for receiving one or more latches mounted on the closure member or door.

23. The actuating assembly according to claim 22, wherein the or each latch defines an upwardly opening groove within which the displaceable keeper plate is captured by abutment of the keeper plate against a wall of the groove when the latch is in a latched position in which it is fast with the door frame or surrounds.

24. The actuating assembly according to claim 23, wherein displacement of the first member operates the latch to unlatch it by causing the displaceable keeper plate to be displaced upwardly so that it is no longer captured within the groove, thus permitting the or each latch to be withdrawn from the aperture of the displaceable keeper plate.

25. The actuating assembly according to claim 24, wherein the second actuating sub-assembly: (i) includes a mechanical lock mechanism which defines a passage or keyway for receiving a mating mechanical key; (ii) is configured to displace the second member when a mating key received in the passage or keyway is rotated; and (iii) includes a drive member which is operably connected to the second member, with the lock mechanism being configured to displace the drive member, with displacement of the drive member causing the second member to be displaced.

26. The actuating assembly according to claim 25, wherein the second member is a drive member of the lock mechanism, the lock mechanism being configured to displace the drive member when a mating key received in the passage or keyway is rotated.

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